

REMARKS

Claims 1-10 are pending.

Claim 1 has been amended to recite that the low refractive index layer comprises "a transparent porous body having bubbles dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof." Support for this amendment can be found on page 14, lines 22-23, and page 17, lines 16-18. More specifically, the recitation that the low refractive index layer comprises a transparent porous body having bubbles dispersed in a matrix can be found on page 14, lines 22-23. The fact that the bubbles are made of a siliceous material and that the porous body has hollow particles dispersed in a matrix can be found on page 14, lines 27-29. The siliceous bubbles (silica aerogel) is described in the paragraphs spanning from page 14, line 30 to page 16, line 35, and in the working examples. The porous body having hollow particles is described in the paragraphs spanning from page 16, bottom line to page 17, line 21.

Furthermore, claim 1 has been amended to recite a lower limit of the refractive index n_L of the low refractive index layer, and the basis therefore lies in formula [4] occurring on page 14, line 15 and page 25, line 11.

No new matter has been added by way of the above-amendment.

Issues Under 35 USC 103

The following rejections are pending:

- A) Claims 1-5, 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over IKEYAMA ET AL (US 6,166,855), in view of OKA ET AL (US 5,747,152).; and
- B) Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over IKEYAMA ET AL (US 6,166,855), in view of OKA ET AL (US 5,747,152), as applied to claim 1 above, and further in view of OSHIMA ET AL (US 6,844,403).

Applicants respectfully traverse both rejections.

Upon review of the Examiner's comments in the outstanding Office Action and the cited references, Applicants have amended claim 1 to clarify that the low refractive index layer comprises "a transparent porous body having bubbles dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof." Applicants respectfully submit that the cited references (in any combination) fail to teach or fairly suggest this feature.

The main feature of the instantly claimed optical multilayer film lies in that the refractive index n_H of the hard coat layer and the refractive index n_L of the low refractive index layer satisfy the above-recited formulae [1], [2] and [3], and further that the low refractive index layer comprises a transparent porous body having bubbles dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof.

It is submitted that, in the case when the low refractive index layer comprises a transparent porous body having bubbles dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof, and when the refractive indexes n_L of the low refractive index layer and the refractive index n_H of the hard coat layer satisfy the above-recited formulae, a polarizing plate can be obtained having a low light reflectivity, an enhanced visibility, an improved contrast and a high abrasion resistance (see *e.g.*, page 4, bottom paragraph).

The factual data showing the above-mentioned benefits of the present invention are given in the working examples in the specification, wherein silica aerogel is used as the transparent porous body having bubbles dispersed in a matrix. To show that the above-mentioned benefits of the present invention can also be obtained when a porous body having hollow particles dispersed in a matrix is used, a co-inventor, Mr. Atsushi Sone, has prepared additional factual data, which are shown as Examples 5 and 6, and Comparative Examples 4 and 5 in the Declaration Under 37 CFR 1.132, enclosed herewith.

Ikeyama et al (US 6, 166, 855)

Ikeyama et al disclose a scratch-resistant antireflection film comprising a transparent polymer film substrate, a hard high refractive index layer, and a porous low refractive layer.

However, Ikeyama et al specifically disclose that the low refractive index layer is formed by dispersing particles having micro voids in an organic polymer. The polymer is used for adhering the particles, and is (1) a surface treating agent, (2) a shell around the particles, or (3) a binder, as described in the following description:

The low refractive index layer preferably contains a polymer. The polymer has a function of adhering particles to keep the micro void structure of the low refractive index layer. The amount of the polymer is preferably so adjusted that the polymer does not invade the micro voids, and keeps the mechanical strength of the layer. The amount of the polymer is preferably in the range of 5 to 50 wt. %, and more preferably in the range of 10 to 30 wt. % based on the amount of the low refractive index layer.

The particles are adhered with the polymer by (1) combining a surface treating agent of the particle to the polymer, (2) forming a polymer shell around the particle (core), or (3) using the polymer as a binder of the particles.

The shell polymer (2) is preferably formed by a polymerization reaction around the particle before preparing a coating solution of a low refractive index layer. The binder polymer (3) is preferably formed by a polymerization reaction of monomers simultaneously with or after coating the low refractive index layer. The monomer of the binder polymer (3) is preferably contained in a coating solution of the low refractive index layer. Two or three polymers (1) to (3) are preferably used in combination. A combination of (1) and (3) or a combination of (1) to (3) are more preferred. The surface treatment polymer (1) is preferably identical with the shell polymer (2) or the binder polymer (3). See column 9, line 47 to column 10, line 4 of Ikeyama et al.

A fundamental difference of the present invention from Ikeyama et al lies in the material of the low refractive index layer. That is, in the anti-reflection film of Ikeyama et al, the low refractive index layer contains micro voids dispersed in a matrix composed of an organic polymer, whereas, in the optical multilayer film of the present invention, bubbles are dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof.

In the case where the matrix of the low refractive index layer is a hydrolyzable organic silicon compound or a hydrolyzed product thereof as in the present invention, and when the refractive index n_L of the low refractive index layer and the refractive index n_H of the hard coat layer satisfy the above-recited formulae, a polarizing plate can be obtained having a low light reflectivity, an enhanced visibility, an improved contrast and a high abrasion resistance. Ikeyama et al do not suggest that these benefits can be achieved by the features of the instantly claimed optical multilayer film.

With regard to the refractive index n_L of the low refractive index layer, Applicants note the following. Ikeyama et al mention that the low refractive index layer has a refractive index of 1.20 to 1.55 (column 7, lines 49-51). Ikeyama et al suggest this broad range of refractive indices, but specifically disclose only the low refractive layers having a refractive index in the range of 1.40 to 1.45, which were formed from an organic polymer solution, in the working examples (Examples 1-9, see Tables 1 to 3). These refractive indices of 1.40-1.45 are larger than that of the low refractive index layer of the optical multilayer film according to the present invention.

The Examiner's attention is now directed to the enclosed Declaration wherein Examples 5 and 6 of the present invention can be compared with Comparative Examples 4 and 5. In the case of the low refractive index layer composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof, if the refractive index n_L of the low refractive index layer is too large, *e.g.*, 1.39, visibility and contrast are poor (Comparative Example 5). In contrast, if the refractive index n_L of the low refractive index layer is too small, *e.g.*, 1.22, the abrasion resistance is very poor (Comparative Example 4). It is to be noted that the refractive index n_L of the low refractive index layer influences not only upon the optical properties, but also upon the abrasion resistance.

Accordingly, clear patentable distinctions exist between the present invention and the teachings of Ikeyama et al.

Applicants respectfully submit that Oka et al. do not cure these deficiencies.

Oka et al (US 5,742,152)

Oka et al mention that the material for a low refractive index layer may be any inorganic material or organic material, provided that the refractive index of the layer is lower than that of a hard coat layer; and specifically discloses various materials (column 29, lines 42-column 30, line 47). However, Oka et al is silent on a transparent porous body having bubbles dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof. Accordingly, Oka et al. do not cure the deficiencies of Ikeyama et al.

Therefore, it is believed that the subject matter of claims 1-5 and 7-10 are not obvious from **Ikeyama et al** combined with **Oka et al**.

Further, the Examiner has cited Oshima et al. for teaching different types of substrates. In view of the fact that Oshima et al. do not teach or fairly suggest the instantly claimed transparent porous body having bubbles dispersed in a matrix composed of a hydrolyzable organic silicon compound or a hydrolyzed product thereof, it is believed that the subject matter of claim 1 is not made obvious by **Ikeyama et al** combined with **Oka et al** and **Oshima et al**.

As such, withdrawal of Rejections **A)** and **B)** are respectfully requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq. Reg. No. 43,575 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Application No. 10/562,567
Amendment dated December 11, 2006
Reply to Office Action of July 11, 2006

Docket No.: 1600-0162PUS1

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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Attachment: Declaration under 37 C.F.R. § 1.132 by Atsushi Sone